

NEXT GENERATION NETWORKS

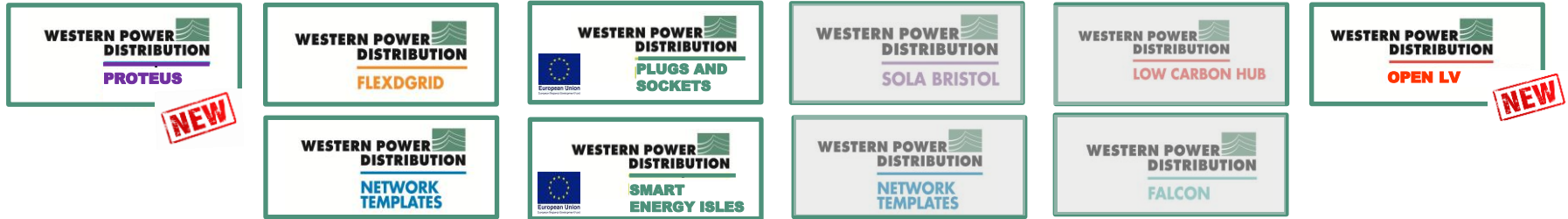
Demand Flexibility

Workshop:

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Future Networks Programme

Assets

- Telemetry
- Decision support
- Improved assets
- New assets
- Flexibility
- Automation
- Incident response



Customers

- New connections
- Upgrades
- Information
- Self Serve
- Products/Service
- Tariffs
- Communities



Operations

- Reliability
- Forecasting
- DSO
- DSR
- GBSO Interface
- Efficiency
- SHE and Security



Network and Customer Data

- Airborne Inspections
- AIRSTART¹
- Telecoms Templates
- Superconducting Cable
- SF6 Alternatives
- MVDC Test Lab
- Smart Energy Laboratory
- Statistical Ratings
- Primary Network Power Quality Analysis

- Hybrid Heat Pump Demonstration
- Hydrogen Heat & Fleet
- Carbon Tracing
- HV Voltage Control
- Solar Storage
- LV Connect and Manage
- Sunshine Tariff
- CarConnect
- Industrial & Commercial Storage

- DSO/SO Shared Services
- Project Sync
- Project Entire: Flexible Power
- Integrated Network Model
- Smart Meter Exploitation
- Distribution Operability Framework
- Data Analytics
- Voltage Level Assessment
- LV Connectivity
- Smart Systems and Heat²

Workshop Format

- Aim to be interactive
- Mixture of Presentation and questions/voting
 - Results of the questions/voting segment can be found on the WPD Innovation Website
- All participants should have a voting keypad

Voting Procedure

- A question will appear on the screen with numbered options. When you are asked to vote press the corresponding number on your keypad
- If you wish to change your choice simply press your new selection. Your last button pressed is the vote cast
- Make your vote before the countdown timer ends.



Voting Test

Which term best categorises your background:

1.	Market Participant
2.	Academic
3.	Equipment Supplier
4.	Network
5.	Other

What is meant by flexibility

- A widely used word with different meanings depending on context
- Generation or demand that can change output following a signal
- “can” means both technically but also commercially
- Many other terms used:
 - DSR
 - ANM



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Flexibility sits in a wider market

- Lots of existing schemes and values for flexibility. This will only increase
 - Need to fit into wider market
 - Commercial development of service just as important as the technical side.
 - Very different from installing kit on the network
 - Direct vs indirect incentives
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Question: view of current market

How well do you understand the current markets for flexibility?

Please range answers from 1 to 9

1	5	9
Not at all	A vague understanding	I fully understand it

Question: view of current market

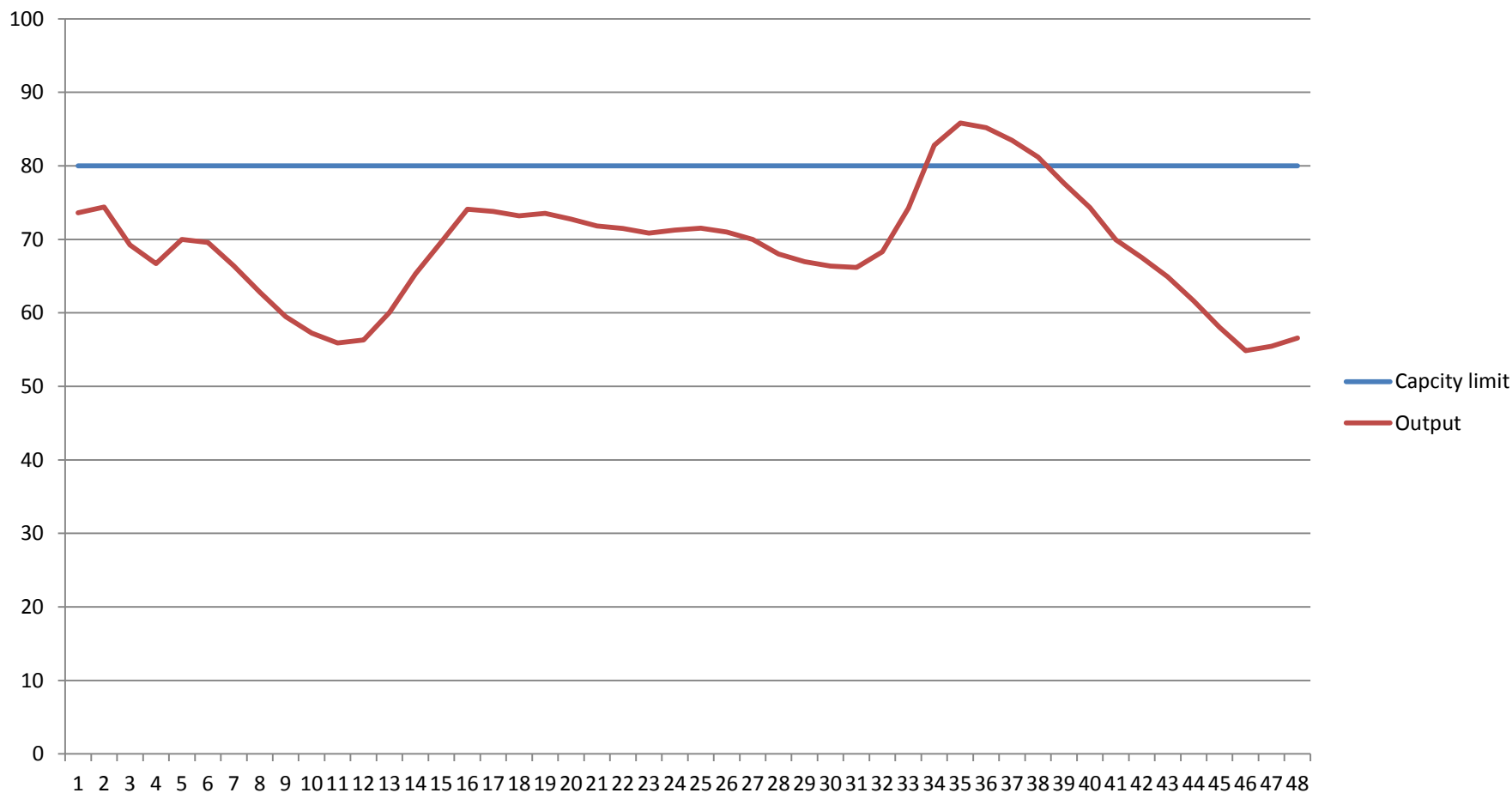
Key issues for any new DNO scheme?

1.	Value
2.	Contractual conflicts
3.	Congested marketplace
4.	Lack of market maturity

DNO use case for flexibility

- Avoid or defer reinforcement
 - For both winter peak and summer minimum
 - Will always compare against traditional reinforcement which has variable costs
 - May be used as an interim to lengthy reinforcement or to allow DNOs to confirm trends
-

DNO use case for flexibility



Question: DNO use case

What is most important aspect of flexibility for DNO?

1.	Location
2.	Cost
3.	Reliability
4.	Scale

Key characteristics

- Locational
 - Higher voltages
 - Limited capacity (pay as you go)
 - Always compared with reinforcement
 - Potentially time bound
 - For n-1 conditions but called pre fault
 - Needs to integrate with ANM
 - Needs to be integrated with other DSR schemes
-

Domestic Vs Industrial & Commercial flexibility

A distinction is often made between Industrial and Domestic flexibility (large and small scale) as they are very different in terms of technical implementation

- For a DNO both will be competing with each other
- Industrial much more mature
- WPD has experience with both

Question: Industrial flexibility

What are the key industries with flexible load?

1.	Utilities
2.	Manufacturing
3.	Services
4.	Logistics

Question: Industrial flexibility

What are the key flexible loads in this sector?

1.	Standby generation
2.	In-process storage
3.	HVAC
4.	Flexible working

Question: Industrial flexibility

What are the key barriers for operators?

1.	Potential to affect processes
2.	Limited available Revenue
3.	Insufficient Notice for services
4.	Lack of understanding of market

Learning from industrial flexibility

- Existing market shows that it is technically feasible.
 - Key challenges around fitting into an existing marketplace, as shown in FALCON
 - The amount of notice is important for reliability
 - The value is important for interest
 - Most flexibility is around embedded generation rather than actual demand shifting
-

Question: Domestic flexibility

As a customer, how much appetite do you have for shifting your load?

Please range answers from 1 to 9

1	5	9
None at all	Depends on the offer	When can I start?

Question: Domestic flexibility

What would be the key domestic flexibility enablers?

1.	Smart meters
2.	HH settlement
3.	Smart appliances
4.	Home storage

Learning from Domestic flexibility

- Domestic market not very mature. Needs significant changes to improve maturity: HH meters, HH settlement, more flexible loads....
 - Even then flexibility of existing loads may be limited
 - DNO not best placed to act as domestic aggregator
 - May be different for new loads (electric vehicle charging)
 - DNOs still need to consider how to connect new LCTs
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Question: Storage

What is the key technology?

1.	Standalone batteries
2.	Water based storage
3.	Flywheels
4.	Others

Question: Storage

How long before storage becomes mainstream?

1.	Within a year
2.	Within the next few years
3.	Within 5 years
4.	Beyond 5 years

Question: Storage

Will it be bigger at domestic or industrial scale?

1.	Domestic
2.	Industrial & Commercial
3.	Stand alone Grid scale

Storage

- Technically Storage works well
 - Expensive at the moment but prices are falling
 - Look for market solutions before DNO led ones
 - Will look to fit batteries into other services
 - Treated like any other flexible load
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Reactive Power Services

- Still to be trialled
 - Service could be used to manage voltage.
 - Reactive services from Customer-owned power electronic devices (solar PV, wind farms, etc.) instead of traditional devices such as Statcoms, SVCs, etc.;
 - Emerging grid code requirements will place requirements on DNOs to actively manage reactive power at the TSO boundary;
-

Enabling connection of more flexible demand

- As well as providing new flexibility markets DNOs have a responsibility to enable connections for other Flexibility markets
 - This involves the connections of new devices to the network
 - Have policies on connection of Electric vehicles
 - Also some projects looking at new flexible loads
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Hybrid Heat Pumps

- To be trialled in Wales in conjunction with Wales & West Utilities;
 - Can be used as fully flexible loads in domestic properties;
 - Load control through fuel switching to optimise outcomes for the consumer, energy supplier and network operator;
 - Creation of a service that can use demand & fuel flexibility to reduce consumer energy bills.
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Industrial & Commercial Storage

- To be trialled on selected WPD sites;
 - Introduction of new demand technologies such as EVs and HPs;
 - Uncertainties in volume, location and type of LV connections;
 - WPD keen to look at new and more flexible ways to design, optimise and manage the network in the future;
 - Network reinforcement can be too expensive and time consuming to respond to LCT connections into the LV network.
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THANKS FOR LISTENING



Serving the Midlands, South West and Wales

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